

## CHAOS THEORY AND THE EFFORT IN AFGHANISTAN

BY

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# USAWC STRATEGY RESEARCH PROJECT

## CHAOS THEORY AND THE EFFORT IN AFGHANISTAN

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## **ABSTRACT**

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This paper will examine the complex security environment in Afghanistan using Chaos Theory as a contextual foundation. Chaos Theory, in contrast to the classic Newtonian sciences, provides the capability of deriving patterns and predictability from seeming disorder. Its application within the physical sciences has yielded tremendous results and the theory has begun making inroads into the social and economic sciences. Chaos Theory provides a method of analysis for complex, non-linear systems such as the ones that challenge the coalition seeking to rebuild Afghanistan. Current strategic planning paradigms seek to simplify complex issues, often failing to recognize the complex interactions upon which these issues hinge.

The paper will provide a brief overview of technical aspects of Chaos Theory and then use the Chaos Theory lens to examine the success of the Marshall Plan for Western Europe following the Second World War. The paper will then turn the focus to the present and examine the military, social, religious, and economic contexts of the current struggle in Afghanistan, offering recommendations to shape a future strategy to realize the coalition's goals.



## CHAOS THEORY AND THE EFFORT IN AFGHANISTAN

Chaos Theory is a relatively new addition to the lexicon of the scientific community. It has the potential for developing detailed models for complex behavior. At the same time, it has significant capabilities to help describe extremely complex systems and allows for valuable insights without completing a single mathematical calculation. Despite its recent development as a theory, individuals and governments have intuitively applied its basic principles with significant success in the past. As this paper will show, the Marshall Plan for the restoration of Europe following the Second World War serves as an excellent example. The world is currently participating in a similar rebuilding effort in Afghanistan. An examination of the country's past and present shows the potential to view Afghanistan through the lens of Chaos Theory, drawing important considerations for future action.

### Chaos with a Capital "C"

Chaos is commonly referred to with a capital "C" to distinguish between the scientific/mathematical theory and the other chaos, with a small "c", that describes a condition of disorder.<sup>1</sup> Chaos Theory seeks to describe a particular set of non-linear systems that make up most of the world – Chaotic systems. Beginning with Isaac Newton, most science and mathematics were deductive, seeking to narrow the possibilities to find the single cause and create a reproducible experiment to give "if A then B." While the world gained immeasurable scientific knowledge from this method, the systems it can describe are all linear. Unfortunately, linear systems define only a very small part of the universe. Non-linear systems make up most of what happens around us. A non-linear system is one whose output is not directly or inversely



proportional to the input. The equations describing these systems will contain exponents, trigonometric functions, and logarithms compared to linear systems having only addition, subtraction, multiplication, and division. In addition, a non-linear system feeds back onto itself – what happened before affects what will happen next.<sup>2</sup>

This means that non-linear systems must be solved in an iterative fashion. This is significantly more time-consuming than a Newtonian linear system in which a solution can be readily attained for any point along the continuum. Due to their iterative nature, non-linear systems cannot be solved manually within a human lifetime. For this reason, many systems were considered too difficult to solve prior to the advent of inexpensive computers.<sup>3</sup>

This outlook on non-linear systems began to change in the 1960's when Dr. Edward Lorenz, a professor of Meteorology at the Massachusetts Institute of Technology, developed a weather model using only basic differential equations. Running on a main-frame, his model behaved like a real weather system, with highs and lows, hurricanes and sunny days. During one experiment, he attempted to reset the system back a few simulated weeks by entering the data on his printout from the middle of the run. He quickly discovered that the reset weather model did not match the original run, initially following closely for a few days and then drastically diverging, showing completely different weather patterns. As it turned out, the printout the doctor used showed only three decimal places but the computer was using floating arithmetic to six places. As a result, his starting numbers for the second run differed from the first run by 0.000127. This was a seemingly tiny difference but the new run yielded very different answers. Dr. Lorenz had discovered a key property of Chaotic systems known

as Sensitivity to Initial Conditions (SIC).<sup>4</sup> Because a Chaotic system is non-linear and feeds back on itself, small inputs can yield big changes. This is illustrated by the two Logistics equations shown in Figure 1.<sup>5</sup> In the Series 1 equation, the growth factor is 4.00. In Series 2, the growth factor is 3.99. Notice the two systems follow closely and then begin to diverge and finally follow drastically different patterns – all from a difference of only 0.01.

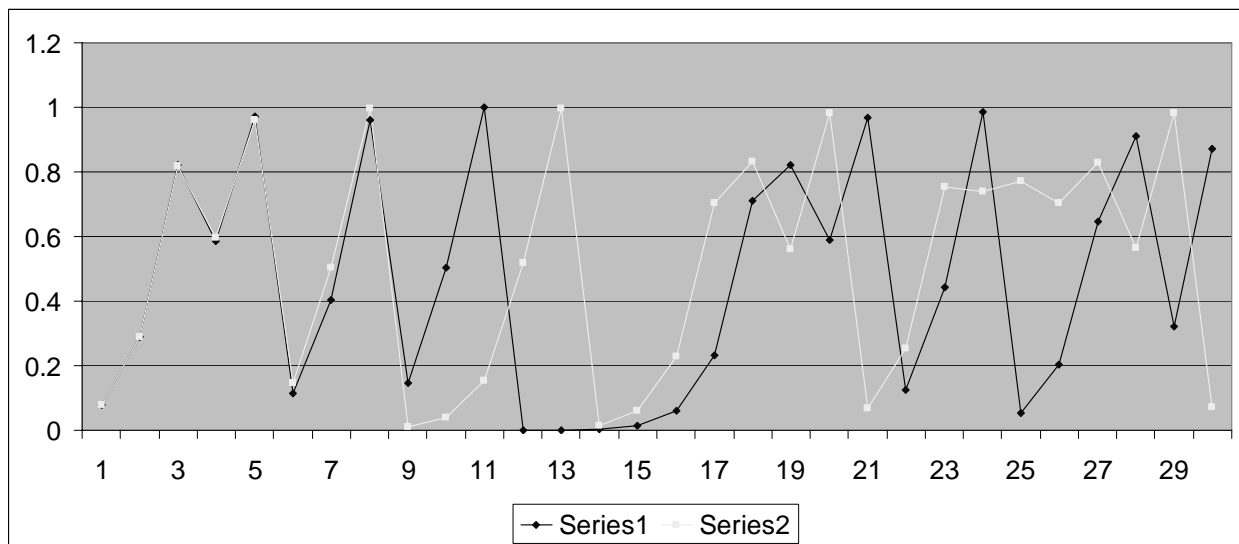


Figure 1 – Sensitivity to Initial Conditions

To help illustrate this and other properties of a Chaotic system, consider traffic patterns on I-495, the loop that runs around Washington, D.C. There are various ways, or parameters, that can be used to measure the performance of the system. For the example, the parameter will be the average speed of traffic passing a particular point on the road measured at one-minute intervals. At 2:30 a.m., one would expect smooth flowing traffic. At 8:00 a.m., the expectation is likely to be heavy stop-and-go traffic. No matter the time of day, there is reasonable expectation that the speeds will not be negative and will be within a reasonable value of the speed limit. Each expectation can be clearly related to the volume of traffic entering and leaving the highway, as well as

the number of vehicles already traveling, affecting the opportunities for new vehicles to merge into traffic. At the same time, there are instances when traffic suddenly slows and becomes a traffic jam. There are many potential causes for this. Sometimes it is as simple as an accident on the other side of the highway and the drivers on the opposite side slow down to gawk as they pass. In the I-495 example, important initial conditions include the number of vehicles attempting to travel the particular stretch of highway, as well as the speed of the traffic.

While all Chaotic systems are non-linear, not all non-linear systems are Chaotic. Non-linear systems can exhibit three distinct types of behavior over time: (1) convergence to stability or equilibrium, (2) stable oscillation, and (3) Chaotic.<sup>6</sup> Each of these states is illustrated using the Logistics equation in Figure 2.<sup>7</sup> Equilibrium and stable oscillation are immediately apparent. For example, the pendulum in a grandfather clock is either at rest (equilibrium) or ticking away into the night (stable oscillation). In a Chaotic system, the solutions demonstrate a seemingly random pattern but, in fact, will demonstrate changes that center on one or more focal points.

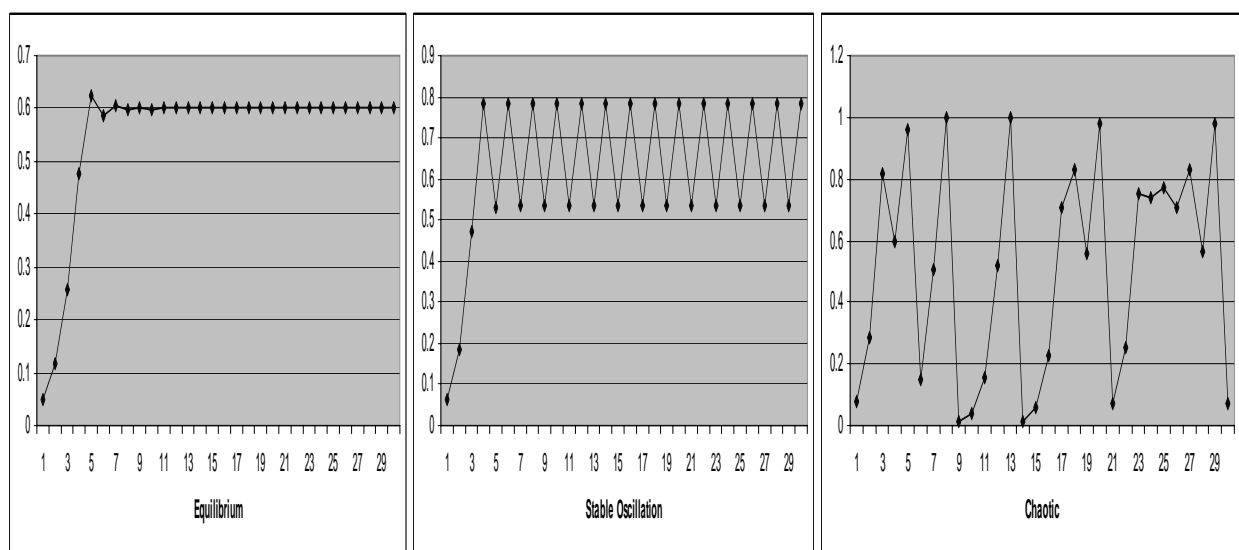


Figure 2 – Equilibrium, Stable Oscillation, and Chaotic Systems

This type of focal point is known as a strange attractor.<sup>8</sup> Despite its unusual name, this is simply a description of a point where solutions may center or orbit. Unlike a periodic system, which repeats patterns of solutions, in a Chaotic system groups of solutions may appear to be similar but will never establish a pattern. Examining the I-495 traffic speeds at 02:30, the expectation is for brisk speeds; say 65 mph, while during rush hour speeds may center around 45 mph. In each case, the exact speed of passing traffic is not precisely 65 or 45, but orbits around the average. At the same time, the speeds will not diverge too far from one another. Thus, given different conditions, the system of traffic flow may orbit around different attractors. This brings us to another important property of a Chaotic system. Because the systems are sensitive to initial conditions, a very small change in the system, a small “kick”, may push the system from orbiting one strange attractor to orbiting another.<sup>9</sup> Figure 3 is a graphic depiction of Dr. Lorenz’ strange attractor.<sup>10</sup> Each point on the line represents an individual solution graphed using a technique known as phase space.<sup>11</sup> When mapped in phase space, a Chaotic system will orbit the attractor but will not occupy the same solution space twice. Notice the solutions seem to orbit one central point, and then suddenly jump across to orbit the other.

The example of the early I-495 rush hour traffic demonstrates this characteristic. At the beginning of the rush hour, as traffic is building but not quite congested, it is common for traffic to move at significant speeds. A single car, moving too slowly while attempting to merge, can create a chain reaction slow down as the other drivers react. If the traffic volume is sufficiently heavy, this single car can create a perpetual slowing in traffic flow. In other words, a very small kick to the system can push the system from

orbiting one strange attractor to another. This has sometimes been called the Butterfly Effect – a butterfly flapping its wings in Venezuela will not cause a typhoon in Tokyo, but, if the atmosphere is already primed, it could be the kick needed to step up the intensity.<sup>12</sup>

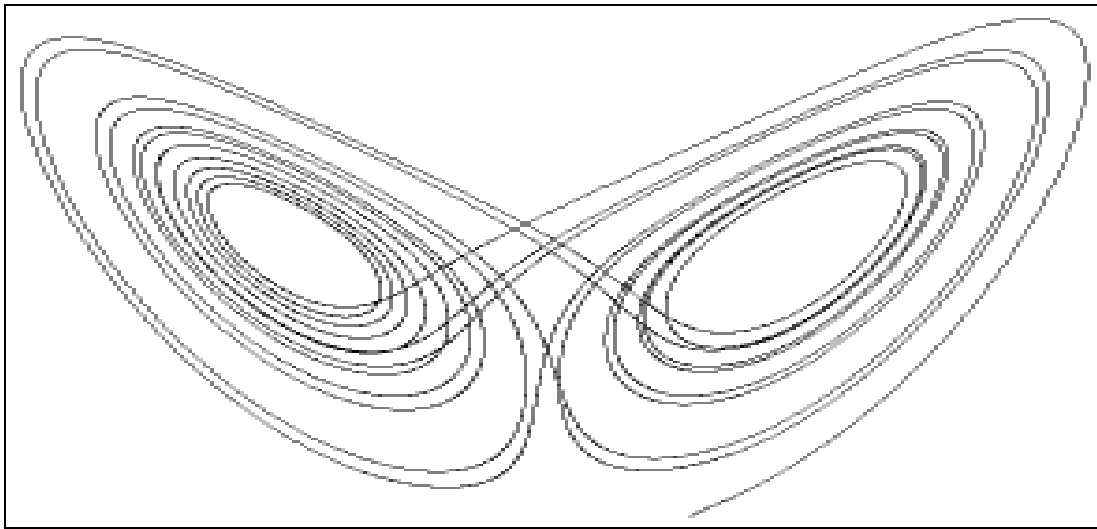


Figure 3 – The Lorenz Attractor

The last key trait of a Chaotic system is its boundaries. This is essential to its usefulness as a potential tool. Chaotic behavior may be less than obvious at first glance, appearing as random activity but within certain mathematical boundaries.<sup>13</sup> The presence of the boundaries serves to make a Chaotic system distinct from a purely random system.<sup>14</sup> Since the solutions must fit within a certain solution space, it is possible to predict a general outcome for a particular solution. Here, the I-495 example helps illuminate the potential Chaotic nature of human systems. While each human theoretically has the ability to make any choice, drivers operating a vehicle on the loop are in fact bounded by the laws of physics, by survival instinct, and by traffic laws. Every social system has a set of boundaries that define possible behaviors, including a failed state in the process of rebuilding.

As we conclude this brief introduction of Chaos Theory, it is worth noting that we have been able to draw inferences on traffic flow without developing a detailed model. For extremely complex systems, such as human society, detailed models are elusive. Chaos Theory allows us to predict outcomes, and therefore potential solutions, without a detailed model.

### Social Science and Chaos

At the basic level, Herman Maslow defined a hierarchy of needs for human beings. Often depicted as a pyramid, this hierarchy rests on the basic needs of water, shelter, and food. At the top of the pyramid is self-actualization. Maslow postulated that human actions and decisions are driven by the particular level of unfulfilled needs the individual has yet to achieve. As each level of need is fulfilled, the individual begins to realize the needs on the next level. In the same way, if a lower level requirement is no longer satisfied; the individual's focus returns to the more basic need. This hierarchy of requirements forms the basic foundation for society – it is society's function to fulfill these needs.<sup>15</sup> Like a Chaotic system, a society receives feedback on its process. If it is meeting its members' needs at the lower levels of the hierarchy, it should continue to strive to attain the higher functions. If it is not meeting the collective needs, its focus will return to the lower levels. In this way, a society is bounded by the needs of its members.

The U.S. State Department has recognized the essential requirements for a stable social structure through its Office of the Coordinator for Reconstruction and Stabilization. In its April 2005 document, "Post-Conflict Reconstruction: Essential Tasks," the department highlights the need for security, reliable food sources, shelter,

and social well-being among its required objectives for successful reconstruction. These serve as precursors for the long-term objective of institutionalizing a long-term development program for the reconstituted society.<sup>16</sup>

Like the hard sciences, social science began with the paradigm of deductive research, looking for the singular, root cause. The intensely varied possibilities within human nature, individually and within society made this a seemingly logical course of action.<sup>17</sup> In recent years, however, social science has begun to consider the potential for Chaos Theory applications in examining social systems.<sup>18</sup>

Ken Booth, Professor of International Politics at the University of Wales, describes one of the boundaries set by human society as strategic culture. This is a still developing cultural idea that began to take shape during the Cold War and is rapidly growing in relevance since the fall of the Soviet Union. A society's strategic culture is a result of its history, geography, and political culture. A strategic culture sets the pattern of behavior for security issues. It has a strong influence on an individual's and organization's interactions dealing with security matters.<sup>19</sup> There is particular relevance in Booth's encouragement that strategic culture can help explain the seeming irrationalities in the behavior of individuals from differing cultural traditions. It may give the observer "nuance and insight into the way a strategic actor might behave in both great and small issues."<sup>20</sup> Culture can provide a starting point in determining the boundaries of a society.

Malcolm Gladwell, in his book *The Tipping Point*, described characteristics he saw in "epidemics", whether they were illnesses, fashion trends, or television shows. He describes a Tipping Point as a set of factors that could drastically change social

systems' behavior in a very short period of time.<sup>21</sup> His book illustrates how small factors can make or break the success of any socially based endeavor. He gives three rules, or properties, of a Tipping Point. First, the Law of the Few – he posits that a group as small as 150 people can drive drastic change for an entire society.<sup>22</sup> Second, the Stickiness Factor – a message or idea must have the ability to create change. It must fit into the system.<sup>23</sup> Third, the Power of Context – the social system must be ready for a change. For example, when Bernhard Goetz stood up to the mugger in the New York City Subway in 1984, he ignited a drastic change in attitude in the city toward crime.<sup>24</sup> While Mr. Goetz' actions were certainly noteworthy, it was the overall condition in the city that allowed his single contribution to tip the system toward drastic change. In attempting to describe why things may suddenly change in a society, Gladwell has provided many parallels to Chaos Theory.

This line of thought has continued to gain traction within the social sciences. Dr. Russ Marion, Professor of Educational Leadership at the University of North Carolina at Chapel Hill, explains that the reality of social systems is continually evolving as our perceptions are expanded by the each new insight.<sup>25</sup> The current limitations are due to the complex nature of human society.<sup>26</sup> He applies Chaos Theory to social systems, likening strange attractors to social behaviors as each is “stable but never quite repeats itself.”<sup>27</sup> This paradigm can help explain dramatic social change as in the transformation of the former Soviet Union in the late 1980s.<sup>28</sup> Due to the significant number of interactions within society, there are few simple, Newtonian sources of events. Instead, small events feed an already robust system ready for change. As an



example, the assassination of Archduke Ferdinand was not the cause of the First World War, merely the kick to the system.<sup>29</sup>

As discussed above in the I-495 example, drivers are theoretically free to make any choice within the realm of physics. They are further bounded by basic human needs, and social restrictions. This same set of rules can be applied on the grander scale of civil society. The strange attractors can range from rampant individualism to tribalism to nationalism with their associated levels of violence toward other groups. The system can be bounded by the desire to fulfill the human needs as described by Maslow and by culture. Outside influences such as an insurgency, foreign aid, or international crime may serve initially as kicks to the system and are then incorporated as an acting force on the system.

#### Marshall Plan – Application of Chaos before it was Invented

In the early days following World War II, the economies of Western Europe seemed to quickly recover. By the spring of 1946, industrial production was at 105-110% of pre-war levels.<sup>30</sup> However, tremendous trade imbalances led to severe malfunctions in the free market systems. Combined with a harsh winter 1946 – 1947 food production fell drastically resulting in wide-scale shortages and starvation. Britain was forced to ration bread – something they did not have to do during the war!<sup>31</sup>

The United States stepped in with the Marshall Plan to prevent total economic collapse and to prevent the spread of Communism. Secretary of State Marshall held two primary tenets for the success of the plan: “a devout belief in “economic health” as prerequisite to “political stability” and a conviction that Western Europe could achieve neither without both initiative and cooperation.”<sup>32</sup> This “only Europeans can save

Europe,” was succinctly articulated by Paul G. Hoffman, Marshall Plan head as Administrator of the Economic Cooperation Administration (ECA), describing the United States’ role as “a catalytic agent and never the main driving force.”<sup>33</sup> Signed into law on 3 April 1948, the Foreign Assistance Act launched the Marshall Plan by creating the ECA.<sup>34</sup> As a key part of the plan, the European nations were required to determine the nature and the distribution of the aid through the Organization for European Economic Cooperation or OEEC, which would eventually lay the foundation for the European Union today. In the end, the Marshall Plan comprised 90% of aid in grants and 10% in the form of loans. Out of all the aid, emergency commodity relief, foodstuffs, feed, fuel, and fertilizers, comprised 60% of the total, clearly focusing on the foundational needs described by Maslow.<sup>35</sup>

The motivations behind the Marshall Plan were both altruistic and political – preventing the spread of Communism in Europe. Long before the advent of Chaos Theory, the leadership of the day recognized important attributes of complex social systems. From a Chaos perspective, requiring the OEEC to organize the distribution of aid helped reduce kicks to the system by allowing action to generate from within the framework of European culture. Providing aid mostly in the form of grants prevented the vicious economic feedback cycle that had preceded the rise of fascism as governments struggled with debt repayment. In the end, the plan was successful in keeping Western European society in orbit around a democratic strange attractor.

### Afghanistan

As in Europe sixty years ago, the United States, in partnership with countries from around the world, is attempting the exceedingly complex task of building a nation in

Afghanistan today. According to one Afghani, “Afghanistan was never a real country. Like Pakistan, it was always a political fiction. Always the invention of other countries – real ones – that had some use for the space it occupies on the maps they drew.”<sup>36</sup> Afghanistan has often been described as the crossroads of Asia. Its strategic location has brought it under the influence of Alexander the Great, Genghis Khan, Tamerlane, the Moguls, the Persians, the British, the Soviets, and currently, the United States.<sup>37</sup> Because of its location, Afghanistan has a large number of ethnic groups with ties to neighboring countries. While the central government has been dominated by the Pashtun tribe since the establishment of Afghanistan in 1747, the ethnic diversity of the country has made strong central control of the country difficult.<sup>38</sup> Dr. Nabi Misdaq, who ran the BBC World Service's Pashto Section from 1982 - 1996, defines the key elements affecting the state as “terrain, environment, tribe, state, religion, language, and perennial weakness of the state. There is an important equilibrium between the center and the periphery as tribal influences compete with the central government.”<sup>39</sup> In the end, the Afghan people are “knitted to their land.”<sup>40</sup> The rugged isolation of the countryside serves as a strong barrier against modernization.

One of the most important influences in Afghanistan is Pashtunwali, a tribal code that permeates Pashtun custom and law.<sup>41</sup> A Pashtun politician succinctly clarified the place of Pashtunwali in everyday life: “I am a Pashtun for 5,000 years. I am a Muslim for 1,400 years. I am a Pakistani for 40 years.”<sup>42</sup> Pashtunwali defines an individual's relationship to family, household, lineage, and tribe. The code of honor and shame emphasizes the warrior spirit and honorable success. Extending between the tribes, it defines a sort of Pashtun nationalism.<sup>43</sup> This tribalism has had strong influence on

governance of the region throughout history. In consideration of the strong tribal ties, the British established the special political status for the region between Pakistan and Afghanistan in 1849 that would eventually become the Federally Administered Tribal Area (FATA) of Pakistan.<sup>44 45</sup> Pashtunwali forms the strategic culture that establishes the boundaries for much of Afghan society. While Pashtunwali is present across Afghanistan because of the large number of Pashtun tribes, it is separate from Islam, which is the religion of nearly 100% of the population.

As the primary religion in Afghanistan, Islam is a significant force throughout the country. The power of the religious leaders is second only to the tribal leaders. Islam serves as a unifying influence for all the tribes of Afghanistan. During normal times, the cohesive power of Islam stays in the background underneath tribal customs, emerging when Afghanistan is threatened by external agents. This is not to say that Islam does not pervade all facets of everyday life, rather that tribal-Islam differences tend to favor the tribe.<sup>46</sup>

A key element of Islam, especially in contrast to Western societies, is the rights of women in society. In 2002, a Muslim cleric appointed to head the Afghan Supreme Court described the “extra” rights of women – rights not afforded to men. First, they have the right to pray (but only at home, mosques are male only). Second, they have the right to obey their husbands. Third, they “have the privilege of restraining themselves from committing bad acts.”<sup>47</sup> Clearly, this stands in sharp opposition to values espoused by Western democracies and poses a potential roadblock to the establishment of a free and democratic society. According to Dr. Muqtedar Khan, Assistant Professor in the Department of Political Science and International Relations at

the University of Delaware, the Islamic world is unable to fully embrace democracy because of the strength of the Islamic jurists. The jurists' nearly exclusive focus on interpretation of Islamic law has stifled the expansion of democratic ideas within the Islamic community since the end of colonial times.<sup>48</sup> The sharp cultural differences and our lack of understanding have the potential to interfere with nearly every attempt at reconstruction assistance. For example, a British team working to provide English language training to teachers was turned away because the textbooks they brought showed pictures of young men and women engaged in un-Islamic activities like sitting at a restaurant table together.<sup>49</sup>

## Recent Events

The rise of Islamic terrorism, especially suicide bombings, has generated significant levels of concern among the population of Islamic and Western countries alike. The Islamic extremist groups supporting or conducting terrorist attacks constitute less than 10% of the overall Islamic population.<sup>50</sup> To most moderate Muslims, suicide attacks should only be considered in extreme circumstances and only when there is a clear benefit for Muslim society.<sup>51</sup> The average citizen of Afghanistan is far more interested in the basic requirements for everyday life than the expulsion of the West or the spread of Islam. Thus, while we cannot ignore the danger of terrorism and its potential to disrupt civil society, we cannot allow it to become our primary focus if we are to succeed in rebuilding Afghanistan.

The fight against the Soviets significantly changed traditional roles among the various tribes, especially as the non-Pashtun tribes were able to learn armed warfare and arm themselves. The withdrawal of the Soviet Union led to a serious scramble for

power between the factions of the Mujahedin. This further weakened the already weak center. Spurred by ethnic counterparts in neighboring countries, especially Pakistan, India, Russia, and Iran, the minority tribes began to assert themselves. The result was a civil war in which warlords gathered power along ethnic, religious, and linguistic lines at the expense of the populations. The impetus for the conflict was the external influence of the neighboring countries.<sup>52</sup> The severity of the fighting opened the door for Muhammad Omar to grow the Taliban movement to occupy nearly the entire country in less than four years.<sup>53</sup>

In the mid-1990s, the Taliban sought to establish Shari'ah Law throughout the country. Nearly all educational opportunities for females were curtailed. The Taliban took over the opium trade from the smaller criminal traffickers producing as much as 3,600 metric tons in the year 2000.<sup>54</sup> During the same time, Osama Bin Laden, who had gained intense popularity as a key Mujahedin leader in the fight against the Soviets, returned to Afghanistan, having been forced to leave the Sudan in 1996. Initially operating in the eastern province of Kunar with the permission of the warlord Rabbani, then the nominal head of the government in Kabul, Bin Laden established residences in Kabul and Khandahar when the Taliban swept into power.<sup>55</sup>

This accommodation, and the Taliban's subsequent refusal to hand over Bin Laden following the events of September 11, 2001, resulted in the U.S. led invasion in support of the Northern Alliance warlords. In effect, the United States joined Russia, India, and Iran in their ongoing proxy fight. Russia and, particularly, Iran were very helpful in orchestrating the necessary compromises to get the Northern Alliance moving.<sup>56</sup> The Taliban fell quickly to the combination of Northern Alliance foot soldiers

and U.S. technology.<sup>57</sup> Hamed Karzai currently heads the U.S. backed government of Afghanistan.

### Current Strategy in Afghanistan

Since the fall of the Taliban, the United States and the international community have made tremendous efforts aimed at reconstruction and the establishment of a democratic society in Afghanistan. Currently, efforts range from the United Nations–mandated International Security Assistance Force (ISAF) in Kabul to the provincial reconstruction teams (PRTs) attempting to extend the influence of the central government to the outlying provinces. These PRTs are made up of civil and military forces as well as representatives of the Afghan government. Each team is under the sponsorship of a parent country.<sup>58</sup> As a result, individual PRTs have developed their own focus, to greater or lesser effect. For instance, the U.S. teams “focus on quick-impact reconstruction projects and internal force protection. British teams concentrate on security sector reform and are willing to intervene in warlord confrontations.”<sup>59</sup> This lack of cohesiveness has reduced the effectiveness of the overall effort.

In addition, much of the aid has failed to make it to the average Afghan. Instead, most of the money has gone to the international experts, contractors, and bureaucrats from the donor nations. As U.S. Ambassador Finn explained when questioned by the head of an Afghan NGO, a large part of the funding has been spent on “necessary ‘start-up costs’ such as renting and refurbishing ‘appropriate work facilities’...and equipping them for ‘appropriate standards’ of international living and work.”<sup>60</sup> LTC Vincent Dryer, USA, highlights this issue with his recommendation to “develop

mechanisms to channel a much greater percentage of foreign aid funds through the Afghan government.”<sup>61</sup>

### United States’ Strategy

Within the umbrella of the overall effort to rebuild Afghanistan, each nation has developed its own strategy. The United States’ strategy for the stabilization and growth of Afghanistan contains the following key elements:

1. Increase the capabilities of the Afghan Security Forces focusing on civil order, counter-narcotics, and border surveillance capabilities.
2. Strengthen the NATO Force in Afghanistan
3. Improve provincial governance and develop Afghanistan's rural economy through 25 joint civilian-military PRTs across the country. These teams will help build irrigation systems, improve power production, and provide access to micro-credit. They will also undertake new efforts to train provincial and local leaders so they can be more effective in delivering real improvements in the lives of their citizens.
4. Reverse the increase in poppy cultivation that is aiding the Taliban by providing farmers who give up the poppy trade with credit, seeds, fertilizer, and assistance to bring their products to market.
5. Reduce corruption – particularly in Afghanistan's Judicial system.
6. Defeat the terrorists and extremists operating inside Pakistan.<sup>62</sup>

This overarching strategy provides the basis for the programs of various U.S. departments. Some key elements from the sub-strategy for United States Agency for International Development that support the U.S. program include:



1. Build and rehabilitate key infrastructure to further economic development and national integration with a primary focus on roads.

2. Encourage economic growth by providing assistance to the Government of Afghanistan to design and implement sound, sustainable, transparent, and predictable economic policy.

3. Foster the development of a viable civil society, including a professionally trained free press and an independent media.

4. Support basic health services especially in rural and underserved areas.

5. Support education throughout Afghanistan including infrastructure, teacher training, and accelerated literacy training for young women formerly denied an education.

6. Provide reintegration assistance to 66,000 former combatants.<sup>63</sup>

In addition, the U.S. Counternarcotics Strategy for Afghanistan also includes engagement in a continuous Public Information campaign focusing on helping the government of Afghanistan achieve sustainable reductions in poppy cultivation and production through public information, engagement, and education.<sup>64</sup>

The resemblance of the current strategy to the Marshall Plan is striking. Beyond the immediate humanitarian needs, the connection of economic security, with its resulting employment, to political stability directly corresponds to one of the primary motivations for action 60 years ago.

Given the intense outside influence on Afghanistan's recent history, any consideration for the future of the country must include at least a cursory examination of

Afghanistan's neighbors. While each is dealing with internal issues of their own, their activities can have a positive or negative effect on progress in Afghanistan.

Pakistan, with its secular government and large Pashtun population plays a significant role in the events in Afghanistan. Just as the communist takeover, the fight of the Mujahedin against the Soviets, the civil war, the rise of the Taliban, and the sustainment and success of the Northern Alliance were all driven by external resources and ideas, the current resurgence of the Taliban in Afghanistan is being driven from the outside. According to James Dobbins, Director of the International Security and Defense Policy Center at Rand who served as a U.S. Special Envoy in Afghanistan, the current insurgency in Afghanistan is not a result of strong opposition among significant elements of the population toward the new government. Rather, the insurgency is supported and manned by residents of Pakistan, "some of whom are refugees from Afghanistan, others of whom are native Pakistanis."<sup>65</sup> This directly relates back to Pashtunwali – tribe before nation-state. The level of official Pakistani support for the insurgency is debatable. Privately, U.S., NATO, Afghan, and UN officials believe the Pakistani intelligence service collaborates with the Taliban and other insurgents operating from the FATA in northwestern Pakistan. The Pakistani government denies any official sanction, claiming it is the independent work of former members of its intelligence service.<sup>66</sup> Given Pakistan's delicate political balance, it is unlikely that the Pakistani government will be able to effectively combat the roots of the insurgency without significant help.<sup>67</sup>

As Afghanistan's most powerful Islamic neighbor, Iran remains an indirect enabler for conflict within Afghanistan. Iran and Afghanistan have clashed politically over

Afghanistan's limiting the flow of dammed tributaries to the Helmand River during periods of drought.<sup>68</sup> Iran remains a major participant in human trafficking from Afghanistan, young boys to the Persian Gulf states, women and girls into Iran for the purposes of sexual exploitation, involuntary servitude, and forced marriage.<sup>69</sup> According to the CIA World Fact Book, "Iran remains a key transshipment point for Southwest Asian heroin to Europe; highest percentage of the population in the world using opiates; [and] lacks anti-money-laundering laws."<sup>70</sup> Iran is actively pursuing a nuclear capability, ostensibly for civilian energy production purposes. President Ahmadinejad has declared that, despite international pressure to the contrary, that Tehran would not negotiate and would continue the research.<sup>71</sup>

Turkmenistan is struggling with widespread internal poverty, a poor educational system, government misuse of oil and gas revenues, and an urgent need for market-oriented reforms.<sup>72</sup> Turkmenistan keeps its economic statistics secret, a lack of transparency that further breaks down the legitimacy of the government.<sup>73</sup> The country serves as a transit point for Afghan narcotics bound for Russian and Western European markets.<sup>74</sup> On the positive side, Turkmenistan, while divided along tribal lines, has been largely free of inter-ethnic hostilities since the break-up of the Soviet Union.<sup>75</sup>

Uzbekistan is currently dealing with issues of Islamic terrorism, a stagnate economy, and difficulty with democracy. A good deal of the Afghan narcotics bound for Russia pass through the country.<sup>76</sup> Following the 11 September attacks on the United States, Uzbekistan allowed the U.S. to use its facilities for forces prosecuting the war in Afghanistan. Popular sentiment, however, has turned against this policy and the U.S. forces were withdrawn.<sup>77</sup>

Tajikistan is in the middle of a security and economic crisis. Until mid-2005, the country was forced to rely on Russian forces to guard sections of the border with Afghanistan. Tajik border guards routinely skirmish with drug smugglers. Tajikistan has been accused by neighboring countries of allowing Islamist rebels to operate training camps inside the country.<sup>78</sup>

Afghanistan's neighbors are dealing with significant societal issues of their own. As described briefly above, these issues interact negatively in both directions with corresponding problems for Afghanistan. As such, they must be included as part of the overall system.

#### Current Ground Truth

Chaos Theory establishes that Chaotic systems exhibit strong Sensitivity to Initial Conditions. Therefore, in considering the situation in Afghanistan as a potential Chaotic system, it is important to establish the current situation in order to determine the actions (kicks) that might potentially push the system toward a strange attractor of our choosing. As a corollary, since we cannot know the current conditions precisely, it is necessary to continuously reassess in order to establish that the kicks are having the desired effect. Since we can predict there will be wild swings as the system makes the transition from one orbit to another, it is through monitoring the boundaries that we will recognize the need to re-evaluate the strategy. A complete description of the ground truth is beyond the scope of this paper. Below, several interconnected systems provide a small slice of the complexity facing the Afghan government.

In March 2007, Assistant Secretary Of State for South and Central Asian Affairs Richard A. Boucher provided a progress report for the Senate Foreign Relations

Committee. In his testimony, the Secretary highlighted several areas of success and of continued concern. On the positive side, “5.8 million students, one-third of them girls, are enrolled in school, versus 900,000 under the Taliban.”<sup>79</sup> Afghanistan has a new Constitution, elections have been held, and the current parliament is over 20 percent women. Around 4.7 million refugees from Pakistan and Iran have returned.

Afghanistan’s leaders have adopted economic policies that have resulted in an annual GDP growth of nearly 14% since 2002.<sup>80</sup> Of concern, the continued poppy production continues to support the Taliban insurgency that operates out of the FATA.<sup>81</sup>

Afghanistan provides 93% of the world’s opium.<sup>82</sup>

Before the same committee, General (Ret) James L. Jones testified that judicial reform is slowed by the low pay of prosecutors, making them susceptible to corruption. A prosecutors' average pay was \$65 a month while an interpreter working for the United Nations makes 500 Euros a month. A senior Afghan judge “earns less than \$100 a month – less than the cost to rent an apartment in Kabul; less than what the Taliban pay locals to support their military operations.”<sup>83</sup>

On 28 October 2007, Afghan President Karzai discussed the social repercussions of an errant bombing of an Afghan community. A U.S. encampment had come under mortar fire and an air attack was ordered on a house in a nearby village, even though U.S. forces had visited the same house the day prior, finding no indication of insurgent activity. Nearly an entire family was killed (with no insurgents) leading to a backlash among the community. President Karzai stated that he had previously discussed the situation with President Bush but was now publicly asking the United States to “roll back the Air Forces.”<sup>84</sup> The United States appears to be working to cooperate. The

Southwest Asia Combined Air and Space Operations Center reported that only two of the 39 close air support missions in the month preceding December 3<sup>rd</sup> involved the dropping of munitions. All others were conducted, effectively, with a show of force.<sup>85</sup>

On 11 December 2007, the Taliban were expelled from Musa Qaleh, their last significant stronghold in Afghanistan's southern province of Helmand by Afghan and coalition troops.<sup>86</sup> The Taliban continues to work to disrupt progress in the country. Schools are a routine target with insurgents often targeting young female students.<sup>87</sup> The Taliban is also attempting to undermine the anti-terrorism support from Pakistan, again exporting violence, including an attack on a school bus carrying children.<sup>88</sup>

Note the effects of kicks in one area of concern on another. Educational opportunity for female students led to increased Taliban support in Pakistan and attacks on school children. Actions against the Taliban resulted in unfortunate civilian casualties leading to a backlash against the Afghan government and the coalition. Success of the efforts against the Taliban led to the Taliban expanding operations into Pakistan.

This is only a brief cross-section of the current state of Afghan society. To the casual observer, the current state of Afghanistan is certainly in-between the country run by the Taliban and the country envisioned by President Karzai and the many nations supporting the reconstruction efforts.

### Recommendations through Chaos Theory Lens

Progress is being made in Afghanistan. It appears to move forward in uneven intervals, much as one would expect in a Chaotic system transitioning from one strange

attractor to another. At the same time, Afghanistan's people strive for the same goals as people everywhere – meeting their basic human and security needs.

Chaos Theory, then, gives us three important considerations. First, Chaotic systems can be pushed from one strange attractor to another by very small forces. These kicks need only be large enough to push an already primed system onto a new trajectory. In dealing with Afghanistan, each new action must be carefully analyzed for its potential to disrupt the system. An example is the strong reaction among the Taliban extremists to the education of women. This program is clearly consistent with Western cultural ideals, and, in the author's opinion, will be of tremendous value for the future of Afghanistan. At the same time, it is a significant departure from Afghan tradition where the education of women was only slowly gaining acceptance. Thus, the education program turned out to be a kick to the system. This does not mean that the coalition should not attempt positive change, rather, should remain aware that seemingly small things may push the system into a Chaotic state, the second important consideration.

Chaotic systems in transition can fluctuate wildly before settling into a more apparent and seemingly stable orbit. In the case of Afghanistan, the public's response to the use of airpower to fight the Taliban and later the Taliban insurgents shows significant fluctuations as the social system moves toward a more stable, open society. Bombs that were initially viewed as essential to routing the enemy have transitioned to an example of American callousness toward the Afghan people. Preparing for these types of shifts during the transitions can provide significant insight in adapting policies ahead of negative reactions.

Lastly, Chaotic systems orbit in a bounded space. In the case of Afghanistan, that space is defined by the three long-term considerations of Pashtunwali, Islam, and the challenges to central government posed by the rugged Afghan terrain. As the United Nations and the coalition work with the government under President Karzai to build a new and stable nation, these three elements will play significant roles in determining the boundaries of the system. The available strange attractors will lie somewhere within this space. Therefore, any short-term solutions will be acceptable to Pashtunwali and Islam, as well as being practical with geographic limitations. This does not limit the potential for gradual change, rather demonstrates the necessity for careful selection of intermediate goals within the framework of a society.

### Summary

The world of the physical sciences has undergone a significant transformation since Dr. Lorenz first recognized the potential for Chaos inside his weather model. This transformation has gained a foothold in the softer sciences as well, though there is still significant progress to be made. Chaos may serve as a new paradigm for examining what we already know – the real world is complicated. The leadership of the United States recognized this as the Marshall Plan was equipped to address the whole issue of rebuilding Europe following the Second World War. As the coalition seeks to assist the Afghani people in rebuilding their country, it is important to recognize the strong influences of tribal and religious factors on the nation's history and their roles in present day society. Chaos Theory gives us a new lens to evaluate our strategy as we pay attention to the small things and prepare for the Chaos, rather than the "chaos", that signals the transition to a new, and better, orbit.



## Endnotes

<sup>1</sup> Glenn James, *Chaos Theory, The Essentials for Military Applications* (Newport, RI: Naval War College, 1996), 2-3.

<sup>2</sup> Susan Durham, *Chaos Theory for the Practical Military Mind*, Student Research Project (Maxwell AFB, AL: Air Command and Staff College Research Paper, March 1997), 8.

<sup>3</sup> James Gleick, *Chaos: Making a New Science* (New York: Penguin Books, 1988), 14.

<sup>4</sup> Ibid, 11-18.

<sup>5</sup> The Logistics Equation is a mathematical model for predicting populations within a particular ecosystem. The formula used for the illustrations is  $X_{\text{next}} = RX(1-X)$ , where X is the population and R is the rate of growth. This equation presents the population in terms of the percentage of the maximum population the ecosystem can sustain on a scale of 0.0 to 1.0. (Gleick, 63).

<sup>6</sup> L. Douglas Kiel, "Chaos Theory and Disaster Response Management: Lessons for Managing Periods of Extreme Instability," California Research Bureau; available from [http://www.library.ca.gov/crb/96/05/over\\_12.html](http://www.library.ca.gov/crb/96/05/over_12.html); Internet; accessed 01 November 2007.

<sup>7</sup> For Figure 2 the rate of growth, R, was 2.5 for equilibrium, 3.5 for stable oscillation, and 3.99 for Chaotic behavior within the equation  $X_{\text{next}} = RX(1-X)$ .

<sup>8</sup> Gleick, 133-135.

<sup>9</sup> James, 29.

<sup>10</sup> *Chaos & Fractals Home Page*, Strange Attractors, available from <http://www.pha.jhu.edu/~ldb/seminar/attractors.html>; Internet; accessed 15 December 2007.

<sup>11</sup> Phase space is a data mapping technique in which all pertinent data is contained in the coordinates of a single point (Gleick, 49-50). In the case of the example automobiles, the phase space might contain the average speed over the one-minute intervals and the difference from the average speed over the previous minute. This would yield a two-dimensional phase space that could be graphed on a standard X-Y Cartesian graph. The space would be bounded by a rectangle.

<sup>12</sup> Gleick, 20-23.

<sup>13</sup> Kiel.

<sup>14</sup> James, 38.

<sup>15</sup> A. H. Maslow, "A Theory of Human Motivation," Originally published in *Psychological Review* vol 50 (1943): 370-396; available from <http://psychclassics.yorku.ca/Maslow/motivation.htm>; Internet; accessed 17 November 2007.

<sup>16</sup> Office of the Coordinator for Reconstruction and Stabilization, "Post-Conflict Reconstruction: Essential Tasks" (Washington, D.C.: United States Department of State, April

2005); available from <http://www.state.gov/documents/organization/53464.pdf>; Internet; accessed 01 December 2007.

<sup>17</sup> Hal Gregersen and Lee Sailer, "Chaos Theory and Its Implications For Social Science Research," *Human Relations* 46 no.7 (1993): 777-778.

<sup>18</sup> Blake LeBaron, "Has chaos theory found any useful application in the social sciences?" Originally on *Scientific American* website; available from <http://people.brandeis.edu/~blebaron/ge/chaos.html>; Internet; accessed 07 December 2007.

<sup>19</sup> Ken Booth, "Strategic Culture: Validity and Validation," *Oxford Journal on Good Governance*, Volume 2, no. 1 (March 2005), 25-26.

<sup>20</sup> Ibid, 27.

<sup>21</sup> Malcolm Gladwell, *The Tipping Point, How Little Things Can Make a Big Difference* (Boston: Little, Brown and Company, 2000), 9.

<sup>22</sup> Ibid, 30-88.

<sup>23</sup> Ibid, 91-92.

<sup>24</sup> Ibid, 133-143.

<sup>25</sup> Dr. Marion, in his book, *The Edge of Organization: Chaos and Complexity Theories of Formal Social Systems*, describes the contributions of many modern thinkers on the application of Chaos Theory and the newer branch of identified as Complexity Theory to social systems. The key distinctions for Complexity versus Chaos are that a Complex system of "interacting entities...tend (a) to correlate with one another because of their interaction, and (b) to catalyze aggregation." (pp. xii) This sort of linkage is used to explain why individuals motivated by "selfish need" will cooperate (page 34).

<sup>26</sup> Russ Marion, *The Edge of Organization: Chaos and Complexity Theories of Formal Social Systems* (London: Sage Publications, 1999), 11-12.

<sup>27</sup> Ibid, 22.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid, 41.

<sup>30</sup> Barry Machado, *In Search of a Usable Past: The Marshall Plan and Postwar Reconstruction Today* (Lexington, VA: George C. Marshall Foundation, 2007), 3.

<sup>31</sup> Ibid.

<sup>32</sup> Ibid, 7.

<sup>33</sup> Ibid.

<sup>34</sup> Ibid, 8.

<sup>35</sup> Ibid, 12.

<sup>36</sup> Ann Jones, *Kabul in Winter, Life without Peace in Afghanistan* (New York: Metropolitan Books, 2006), 208.

<sup>37</sup> Nabi Misdaq, *Afghanistan, Political Frailty and Foreign Interference* (London: Routledge, 2006), 2.

<sup>38</sup> Ibid.

<sup>39</sup> Ibid.

<sup>40</sup> Adrian Bogart III, *One Valley at a Time. Joint Special Operations University Report 06-6* (Hurlburt Field, FL: The JSOU Press, August 2006), 14.

<sup>41</sup> Misdaq, 10.

<sup>42</sup> Bogart, 13.

<sup>43</sup> Misdaq, 11.

<sup>44</sup> *Civil Secretariat (FATA) Homepage*, available from <http://www.fata.gov.pk/>; Internet; accessed 07 December 2007.

<sup>45</sup> Misdaq, 293 -299.

<sup>46</sup> Ibid, 234-235.

<sup>47</sup> Jones, 115.

<sup>48</sup> M. A. Muqtedar Khan, "The Politics, Theory, and Philosophy of Islamic Democracy," in *Islamic Democratic Discourse*, ed. M. A. Muqtedar Khan (Oxford: Lexington Books, 2006), 157-166.

<sup>49</sup> Jones, 217.

<sup>50</sup> David Cook, *Martyrdom in Islam* (Cambridge: Cambridge University Press, 2007), 163.

<sup>51</sup> Ibid, 149.

<sup>52</sup> James Dobbins, "Ending Afghanistan's Civil War," Testimony before the Senate Foreign Relations Committee (08 March 2007) 1 [database on-line]; available from ProQuest; accessed 01 November 2007.

<sup>53</sup> Misdaq, 167-189.

<sup>54</sup> Kimberley Thachuk, "Transnational Threats: Falling Through the Cracks?" *Low Intensity Conflict & Law Enforcement*, Vol. 10, No. 1, Spring 2001 (London: Frank Cass Publishing, 2001), 55.

<sup>55</sup> Misdaq, 242-243.

<sup>56</sup> Dobbins.

<sup>57</sup> Misdaq, 246-248.

<sup>58</sup> Vincent Dreyer, "Retooling the Nationbuilding Strategy in Afghanistan," *Joint Force Quarterly*, no. 43 (4th Quarter 2006): 36.

<sup>59</sup> Ibid, 37.

<sup>60</sup> Jones, 86.

<sup>61</sup> Dreyer, 38.

<sup>62</sup> The White House, Office of the Press Secretary, "White House Outlines U.S. Strategy in Afghanistan," available from <http://usinfo.state.gov/xarchives/display.html?p=washfile-english&y=2007&m=February&x=20070215115104abretnuh0.7379267>; Internet; accessed 03 November 2007.

<sup>63</sup> USAID, "USAID/Afghanistan Strategy," available from <http://afghanistan.usaid.gov/en/Page.CountryOverview.aspx>; Internet; accessed 03 November 2007.

<sup>64</sup> Thomas Schweich, *U.S. Counternarcotics Strategy For Afghanistan*, Strategy Statement published by the U.S. Department of State (August 2007), 17-18; available from [www.state.gov/documents/organization/90671.pdf](http://www.state.gov/documents/organization/90671.pdf); Internet; accessed 03 November 2007.

<sup>65</sup> Dobbins.

<sup>66</sup> Ibid.

<sup>67</sup> Ibid.

<sup>68</sup> Central Intelligence Agency, World Fact Book – Iran; available from <https://www.cia.gov/library/publications/the-world-factbook/geos/ir.html>; Internet; accessed 02 December 2007.

<sup>69</sup> Ibid.

<sup>70</sup> Ibid.

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<sup>73</sup> Ibid.

<sup>74</sup> Ibid.

<sup>75</sup> BBC News, Country Profile – Turkmenistan; available from [http://news.bbc.co.uk/1/hi/world/asia-pacific/country\\_profiles/1298497.stm](http://news.bbc.co.uk/1/hi/world/asia-pacific/country_profiles/1298497.stm); Internet; accessed 02 December 2007.

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<sup>81</sup> Ibid.

<sup>82</sup> Schweich.

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<sup>84</sup> Muhammad Kharzai, President of Afghanistan. Interview by Scott Pelly of CBS *60 Minutes*, 28 October 2007, Kabul, Afghanistan; available from [http://www.cbsnews.com/sections/i\\_video/main500251.shtml?id=3421351n](http://www.cbsnews.com/sections/i_video/main500251.shtml?id=3421351n); Internet; accessed 31 October 2007.

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